the skill and ingenuity of the highly trained physician and electrical engineer. The medical profession as a whole is aware of this fact, and also that a political layman placed before the last California State Legislature a bill to permit other laymen to take this dangerous agent and use it upon an innocent public under restrictions which are pitifully inadequate, both as to the qualifications of those who may use this agent and as to the limitations placed upon its use. That such an act should be permissible in this enlightened age is merely another instance of the commercial greed of the medical parasites who, with the aid of politicians, are continuously undermining the standards of scientific medicine and surgery, and flooding the country with a host of undesirables, perhaps more threatening to our civilization than the Red Bolshevists of Russia.

Note by Author—Bill referred to passed Assembly and State Senate about six weeks after the presentation of above article. When it reached the Governor's desk for his signature, a flood of protests from some of the members of the California medical profession caused him to withhold his signature and thereby nullified the act. In the last meeting of the American Medical Association, a resolution was adopted by the House of Delegates, recommending that radiology be considered an integral part of the practice of medicine and surgery.

(1407 South Hope Street.)

Health as a Means and Not an End—The trouble with these groups who follow the teachings of faddists and special cults is that health is thought of as freedom from disease, as an end. This view is quite commonly expressed, and in these days of great interest in the health movement it constitutes a real danger. It may be stated categorically that health should never be sought as an end, except perhaps by the individual sick in bed. To be conscious of bodily processes, to think too much about one's self, is not only undesirable socially, but also is distinctly unwholesome for the individual. No person may with impunity be too greatly concerned about his health; for, the moment he does, he runs the risk of losing it.

The health motive must be made secondary to objective interests and achievements. As educators it is important that we sense this relationship and guide the program of teaching toward goals of service rather than toward those of personal achievement. Health is to be viewed therefore only as a means for the accomplishment of worth-while things for the world. "Health for health's sake" is not an acceptable slogan. The poseur and the dilettante in health are no more acceptable than the poseur and dilettante in art. That splendid specimen of man power, that wonderful organization of vitality in the healthy woman—are such sufficient unto themselves? Surely no educational theory would seek to justify the development of mental power for its own sake; likewise it will find impossible the plea of those who seek health for health's sake. Rather will it defend the view that health is only of value, only of significance, as it is used in socially desirable ways. The social consciousness of our day asks that we act as trustees of life, enriching it where we may, but always conserving it for worthy ends, ready to spend it all if the demand be great enough. . . .

Health as freedom from disease is a standard of mediocrity. Health as a quality of life is a standard of inspiration and increasing achievement. The hope may be expressed that the great interest in health education today shall be directed toward not only scientifically acceptable goals, but also goals that shall be worthy.—(Jesse Feiring Williams, Hygeia, September, 1923.)

HEART FAILURE: ITS UNDERLYING CAUSES, CLINICAL MANIFESTATIONS AND TREATMENT*

By WILLIAM J. KERR, M. D., San Francisco
(From the Medical Division, University of California Hospital.)

The increasing death rate from cardiovascular disease is attracting widespread attention. As the expectancy of life rises, we see more individuals reaching the age when certain vascular and myocardial disorders are prone to occur. We are constantly seeking the underlying causes of these maladies which we are called upon to treat, keeping in mind the idea of prevention. These causes probably often lie hidden in the earlier period of life associated with infections, intoxications, nutritional disorders, congenital malformations, hereditary, and other obscure factors. Medicine of the future will probably deal more with the prevention of such of these as are preventable when the methods by which they are produced are more fully understood. The role of the clinician in the treatment of end results of disease is too often unsatisfactory and much like the patch-work of the cobbler. This is probably more applicable to cardiovascular disease than of any other group.

With the increasing morbidity and mortality from cardiovascular disease, we would have a clearer conception of heart failure, its predisposing causes, clinical manifestations, and treatment. Unfortunately, the only notion many physicians have of heart failure is conveyed to them by heart murmurs or irregularities. They neglect the most important factor in estimating the efficiency of the circulation; namely, the efficiency of the heart muscle itself. The back-pressure theory has done much harm by directing attention away from the physiological functions of the heart muscle. MacKenzie's conception of a "rest force, which is employed to maintain an efficient circulation when the body is at rest, and a "reserve force," which is called into action when effort is made, is more readily acceptable. The "reserve force" is the first to suffer and, if the damage is extensive enough, the "rest force" is impaired and the body even at rest shows evidence of inefficiency resulting in dropsy, dyspnoea, and a multitude of other signs which may be included in the wide sense under the term "heart failure." MacKenzie's definition of heart failure is a broad one—"Heart failure may be defined as the condition in which the heart is unable to maintain an efficient circulation when called upon to meet the efforts to the daily life of the individual."

THE UNDERLYING CAUSES OF HEART FAILURE

When we seek to correlate the pathological changes in heart failure with the clinical manifestations, there is great variation and confusion. Our findings are in no better accord than are the pathological changes, clinical symptoms, and signs and functional studies in renal disease. The parallel serves to point out the importance of recognizing functional efficiency rather than structural changes

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in dealing with these two vital organs. The frequency with which heart failure ensues with no demonstrable lesions in the heart muscle is of significance. Instrumental methods as an aid in detecting and understanding the irregularities have served to clear up some of these obscure relationships. Others await more delicate methods of study.

The conditions which precede and which are often confused with heart failure may be classed as (1) infections usually rheumatic and not including syphilis, (2) syphilitic infections, (3) arteriosclerosis, (4) nephritis and hypertension, (5) thyroid disease, (6) congenital defects. These various groups usually occur at certain age periods, and lead to changes in the heart muscle which may bring about heart failure. They may be spoken of as predisposing causes of heart failure. They are probably not the only predisposing causes, but make up a great majority. Just when in a given case heart failure will take place is difficult to determine, but we can prophesy in a general way within the various groups. We know from experience that patients with continuous hypertension usually terminate with heart failure. Patients with rheumatic valvular disease run a progressive course with heart failure developing sooner or later, the nature of the symptom-complex usually depending upon the location and extent of the valvular and myocardial lesions. Thyroid intoxications if unrelieved lead to extensive damage of the heart ending in heart failure. Syphilitic disease involving the aortic valve tends to early heart failure. Arteriosclerosis may manifest itself in a variety of ways. Among the most frequent consequences are obstructive lesions of the coronary vessels with degenerative changes in the muscle supplied by these vessels resulting in ultimate heart failure. Subacute and acute endocarditis associated with septicemia and presenting a rather uniform clinical picture seldom die of cardiac failure, but more frequently as a result of septicemia, embolism, pneumonia, or nephritis.

The recent widespread use of instruments of precision in the study of heart disease has been of great service in clearing up the mysteries of the irregularities. The present extent of our knowledge in this field makes it possible for the well-trained clinician to dispense with instrumental means of diagnsois in most instances. To the great majority of practitioners, however, irregularities spell disaster. This is evidenced by the frequency with which patients with sinus arrhythmias are referred for electrocardiogram and opinion. Instrumental means have shown the frequent occurrence of such irregularities as paroxysmal auricular fibrillation, paroxysmal auricular flutter and paroxysmal tachycardia which formerly were considered synonymous with heart failure. We now know that even permanent auricular fibrillation and complete heart-block may be compatible with an active muscular life without signs of heart failure. There has been much discusssion concerning the importance of extrasystoles or premature contractions and, when further work has been done over a period of many years in patients presenting such irregularities, we shall probably attach more significance to them. Recent studies with quinidine have served to throw new light on the nature of some of these irregularities, particularly in auricular fibrillation.

CLINICAL MANIFESTATIONS OF HEART FAILURE

When we attempt to enumerate the clinical manifestations of heart failure, we are confronted with a seemingly hopeless task. We see patients whose "reserve force" is encroached upon to the slightest extent and who show dyspnoea only on severe exertion. At the other extreme we see patients whose "rest force" is so impaired that they are unable to undergo the slightest exertion without marked dyspnoea, with extensive passive congestion, cyanosis, and other associated signs. Between these lie all gradations.

Among the earliest symptoms to be noted in the congestive type of heart failure are dyspnoea with severe exertion; slight cough toward the end of the day; varying degrees of precordial and substernal pain; upper abdominal pain associated with distended liver, congested stomach or pain referred from the heart muscle or pericardium; and such symptoms as giddiness, palpitation, and a feeling of faintness. The latter group are subject to a variety of interpretations, as patients differ widely in their description of such symptoms. As the failure becomes more severe, the symptoms tend to increase; the dyspnoea and cough show a definite advance; such signs as dependent edema appear late in the day; the heart shows variable degrees of enlargement; irregularities may be present; the vital capacity is reduced and passive congestion is more evident. Venous engorgement appears; the venous pressure is increased and pulsations in the peripheral veins, as well as the jugulars, may be noted. The urine begins to show signs of the renal congestion present. With the onset of the more advanced stages, the above-mentioned symptoms and signs increase until marked dyspnoea and orthopnea are present, and prevent the patient from undergoing the slightest effort. The congestvie signs are now extreme, anasarca appears, the vital capacity is markedly reduced and, unless proper treatment is instituted, death is likely to ensue.

While this picture illustrates the sequence in a considerable number of cases of heart failure, there are many cases where few or none of these symptoms may be found. Patients with hypertension, syphilitic infections of the aortic valve, rheumatic endocarditis involving primarily the aortic valve and others may, when presenting quite efficient circulatory systems, suddenly develop a pulmonary edema, and die. Patients with the symptom complex of angina pectoris may die in the first attack or may suffer for years and die of some other condition. Myomalacia may develop without warning from embolism or arterial occlusion, and lead to fibrosis or aneurysm of the heart wall without presenting the usual signs of congestive heart failure. A heart wall may rupture with sudden death of the patient without giving rise to signs of warning. The inception of unusual rhythms may herald the onset of heart failure, and such irregularities as ventricular tachycardia or ventricular fibrillation may cause death without previous symptoms or signs of heart failure. Stokes-Adams syndrome may

be observed in patients over periods of many years without great impairment of the circulation, or death may ensue in one of the attacks.

TREATMENT

The greatest degree of success in treatment is to be achieved in the group spoken of as the congestive type of heart failure. Rest is most essential. If the condition is moderately advanced or severe, the circulatory system should be relieved as much as possible by limiting the fluid intake, free purgation, and diuresis. Collections of fluid in the body cavities interfering with respiration or heart action may be removed. Karrel diet may be employed during the first few days if the edema is excessive. After this a dry diet should be given and should only meet the bodily needs. The comfort of the patient is of extreme importance throughout treatment. Patients with orthopnoea should be well supported in bed or chair with a firm, well-padded board or contrivance upon which to rest the arms, and relieve the embarrassment of respiration. Pain should be relieved by small doses of morphine, especially during the first day or two of treatment, as pain prevents proper rest. The drugs employed depend entirely upon the conditions present. If auricular fibrillation is found and the rate is rapid, digitalis should be started at once. The preparation must be of known potency and should be given until results have been obtained unless toxic symptoms prevent further continuance. This may be given rapidly by the Eggleston method or preferably by 4 cc. doses of standardized tincture every six hours over a longer period of time in general practice. It matters little in what form the drug is given, so long as the clinician knows his preparation. It is deplorable to see how badly we administer such a valuable remedy. Despite the many noteworthy contributions on the subject, many clinicians continue to prescribe ten drops of a tincture of doubtful source when we have demonstrated to students for years that it takes from thirty-five to sixty drops with the ordinary medicine dropper to make a *cubic centimeter,* which *is the standard dose of a standard tincture.* We should either have at hand calibrated droppers or graduates for the patients to use or dilute the tincture, and give in teaspoonful doses. It would be preferable, however, if we dispensed entirely with the tincture except in hospital practice, and gave the dried leaf in 0.1 gram or 1½ grain doses in pill or capsule form. The hypodermic or intravenous use of digitalis preparations are seldom necessary and their use too often unsatisfactory because they are given in hopeless conditions.

A drug such as caffein sodio-benzoate is often of value, especially in patients with hypertension and cardiac failure to relieve respiratory irregularities. Caffein may prove to have some value when given intravenously in emergencies for cardiac or circulatory failure. When syphilis is an underlying cause of heart failure, proper treatment with iodides, mercury, and the arsenicals may be of great value, but should be given with great caution. Quinine compounds, especially quinidine preparations, have been of great value in controlling some of the irregularities. Auricular fibrillation responds to treatment in a majority of the cases, and further attacks may be prevented by its continued use. In this way quinidine relieves the heart of conditions which interfere with the proper function of the heart, and in so doing aid in the treatment of heart failure.

Patients with pulmonary edema may respond to bleeding, especially with right heart failure. Patients who have for long had hypertension and who present pulmonary edema with a low blood pressure probably should not be bled. Atropin or adrenalin may here be of value. In those who have had hypertension and who slowly or periodically show signs of heart failure, it is interesting to note that symptoms and signs are present if the pressure falls below a certain high level. Some of these symptoms and signs are congestive in type. Others are mental. Other patients may present cerebral symptoms only when the blood pressure is high. Whether these episodes are spasmodic in nature, it is difficult to say. It is frequently found that there is a narrow limit of circulatory efficiency in which the patient appears to be most comfortable. The treatment of this group is most difficult and often very unsatisfactory because of the economic and other factors which cannot be controlled.

The thyroid hearts respond well to treatment if the damage is not too extensive and do not offer any special problem if the disease of the gland can be corrected.

The arteriosclerotic heart presents such a variety of symptoms and signs that no definite criteria can be laid down for treatment. The activity of the individual should be limited to what the heart is able to do. Iodides may be of value. Mercury does no harm. Attacks of angina pectoris usually respond well to nitrites. Surgery for nerve resection may be tried. The persistent pains associated with extensive damage of the heart wall do not respond so well, and usually indicate an early death.

SUMMARY

Heart failure should be recognized as the inability of the heart muscle to maintain the circulation for the ordinary needs of the individual. It is not expressed in terms of murmurs, irregularities, pain or other signs or symptoms, which may be associated, but rather as the result of a variety of underlying causes which act to render the function of the heart muscle ineffective.

The clinical manifestations of heart failure are obviously manifold and variable, based upon a broad interpretation of the term. The manifestations of congestive heart failure represent the common group and have many points in common.

The treatment of heart failure is more satisfactory in the congestive group. Syphilitic infections of the heart respond well to judicious treatment. A drug, as useful as digitalis, especially in the pres-

ence of cardiac failure with auricular fibrillation, has an established place in our armamentarium. Ten drops of a standard tincture, given with an ordinary dropper three times a day, can have no conceivable value in such cases. The further use of the tincture for home administration is to be deplored, unless given in known dosage of a standard preparation until results have been achieved.

DISCUSSION

Dudley Fulton, M. D. (Pacific Mutual Building, Los Angeles)—The broad conception of heart failure and its treatment, as expressed by Kerr, represents the best clinical teaching. Certain points should be emphasized. There is no parallel between the pathology of the heart, as ascertained by physical examination, and its functions. While murmurs are important in the diagnosis of organic disease of the heart, they play a very minor role in prognosis, since the heart may maintain the circulation over prolonged periods with any one of its valves totally destroyed. The functions of the myocardium form the ground-work of the present knowledge of the heart. In one of the largest clinical groups, the cardiac disease associated with hypertension, nephritis and arteriosclerosis, the evidence is strong that the initial pathology arises elsewhere in the vascular tree than the myocardium, probably in the smallest arterioles, the cardiac and the renal changes being secondary processes. The term "circulatory failure" in this group is more accurate than "heart failure."

This conception broadens therapy to the adoption of measures conducive to the maintenance of the circulation as a whole rather than to stimulation of the heart.

Emphasis should be given another important principle enunciated by Kerr. While we can never repay our debt to the stethoscope and electrocardiagraph, their employment having given us interesting and valuable academic details concerning the functions of the heart, we must admit, however, that it is bed-side study and observation that gives us the practicable information as to how sick our cardiac patient is, and what should be done for him. Instrumentation has been overdone in that the examination of the patient himself is neglected.

Of first importance are the subjective symptoms of the patient. They present the earliest and most dependable evidences of a failing circulation. This includes the proper interpretation of dyspnoea and precordial distress, following anything which increases the heart beat, such as exertion, meals, and mental excitement. A consideration of edema of the liver and extremities, lessened urine output, cyanosis and pallor clearly outvalues the timing of a murmur. It is interesting that disturbed cardiac rhythm offers the best indications for drug treatment. While digitalis is always indicated in broken compensation of the heart, its effects are usually disappointing except in auricular fibrillation and sometimes auricular flutter.

We disapprove, however, the use of the very large doses of digitalis recently advised, except by the cardiac expert, in the disturbances mentioned above. McKenzie considers that digitalis is as sharply limited in diseases of the heart as quinine is in fevers.

The same criticism, in our opinion, applies to quinidine. Its use in general practice should be deferred until its precise indication and dosage are better determined than at present. Disaster has followed its use in a sufficiently large number of reported cases to justify this conservatism.

Dr. Kerr (closing)—I am very glad to have the opinion of Dr. Fulton on the points which I brought out. His wide experience in internal medicine makes these opinions extremely valuable.

THE ESSENTIAL POINTS IN THE TREATMENT OF DIABETES WITH INSULIN *

By W. D. SANSUM, M. D., and
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The work of Banting and Best and their associates in the isolation and clinical use of the sugar-metabolizing hormone, insulin, and its specificity in the treatment of diabetes is now well known and accepted. There remains the general problem of further perfecting the methods of its use.

Since the advent of insulin, 250 diabetic patients have been admitted to this clinic. Of these, 150 have been severe enough to warrant the use of insulin. It is beyond the scope of this paper, which is intended to outline methods of treatment only, to present the clinical data at hand. The clinical results from the first 100 cases have been carefully summarized and will appear at an early date in the Journal of Metabolic Research.

In the treatment of diabetes there are three objects to be attained:

1. The patient should be kept continuously "sugar free," and the blood sugar should be normal.

2. The patient should be kept continuously free from acidosis.

3. The patient should be nourished as evidenced by a satisfactory weight.

These conditions may be fulfilled, in many instances, by careful dietary procedures, although when a patient's tolerance is very low, continuous bed-rest is necessary to avoid a serious loss of weight. If the disease becomes progressively worse, as it usually does in severe and untreated cases, a stage is finally reached when the patient can no longer be kept free from sugar and acidosis, even if the most careful attention is paid to the diet and the patient is kept continuously in bed.

Many patients wait too long before beginning careful, dietetic management, and specialists in the treatment of this disease are, therefore, not given a fair chance to do the best work. Dr. Joslin has collected the statistics, showing the advantages of careful treatment. Between the years 1814 and 1914 the death rate from diabetes in patients who were treated in the best hospitals was 28 per 100 per year. The year 1914 marked a significant advance in the dietary treatment. The principles outlined in the first paragraph were carefully adhered to. In patients so treated the death rate has fallen to 4 per 100 per year.

By the use of insulin, the death rate from diabetes may be reduced to zero if the patients are seen before deep coma has developed, and patients who would otherwise remain chronic invalids may be restored to health by ample diets in proportion as this specific extract becomes available. At the present cost it is not available to all. It is not a cure for diabetes. Patients will need to exercise greater care than ever with their diets, but since these diets will be ample for their needs, they will be fully repaid for the additional efforts.

* Presented to the Section on Medicine, San Francisco, June, 1923.